

AMENDMENTS TO THE CLAIMS:

The following listing of claims replaces all prior listings, and all prior versions, of claims in the application.

Listing of Claims:

Claim 1. (Cancelled).

2. (New) A fabrication method of a semiconductor integrated circuit device, comprising the steps of:

- (a) forming a first insulation film over a major surface of a wafer;
- (b) forming an interconnect groove in an upper surface of said first insulation film;
- (c) depositing a metal layer containing copper as its principal component over the upper surface of said first insulating film and inside said interconnect groove;
- (d) removing the metal layer outside the interconnect groove by chemical mechanical polishing so as to leave a metal interconnect in the interconnect groove;
- (e) after step (d), carrying out wet cleaning treatment to the major surface of the wafer;
- (f) after step (e), carrying out first plasma treatment in a first gas atmosphere including an ammonia gas to the major surface of the wafer;

(g) after step (e), carrying out second plasma treatment in a second gas atmosphere including an ammonia gas to the major surface of the wafer; and

(h) depositing an insulation copper diffusion barrier film by plasma chemical vapor deposition on the upper surface of said first insulation film and metal interconnect treated by the first and second plasma treatments.

3. (New) A fabrication method of a semiconductor integrated circuit device according to claim 2, wherein said wet cleaning treatment includes a cleaning process using an alkali solution and a cleaning treatment using an acid solution.

4. (New) A fabrication method of a semiconductor integrated circuit device according to claim 3, wherein said alkali solution includes aminoethanol.

5. (New) A fabrication method of a semiconductor integrated circuit device according to claim 3, wherein said wet cleaning treatment has a step to carry out a cleaning process using said alkali solution, a reducing process and a cleaning process using said acid solution in that order.

6. (New) A fabrication method of a semiconductor integrated circuit device according to claim 3, further comprising the step of:

(i) carrying out a reducing process after step (d) and before step (e).

7. (New) A fabrication method of a semiconductor integrated circuit device according to claim 3, further comprising the step of:

(i) carrying out a reducing process after step (d) and before a cleaning process using said acid solution.

8. (New) A fabrication method of a semiconductor integrated circuit device according to claim 7, wherein said reducing process carries out a heating process to the major surface of the wafer in a hydrogen gas atmosphere.

9. (New) A fabrication method of a semiconductor integrated circuit device according to claim 7, wherein said reducing process carries out a hydrogen gas plasma process to the major surface of the wafer.

10. (New) A fabrication method of a semiconductor integrated circuit device according to claim 7, wherein said reducing process carries out an ammonia gas plasma process to the major surface of the wafer.

11. (New) A fabrication method of a semiconductor integrated circuit device according to claim 2, wherein said wet cleaning treatment includes a step to carry out a cleaning process using an acid solution.

12. (New) A fabrication method of a semiconductor integrated circuit device according to claim 11, further comprising the step of:

(i) carrying out a reducing process after step (d) and before said cleaning process, using an acid solution.

13. (New) A fabrication method of a semiconductor integrated circuit device according to claim 2, wherein a heating process is carried out on the wafer in a reducing gas atmosphere after step (e) and before steps (f) and (g).

14. (New) A fabrication method of a semiconductor integrated circuit device according to claim 2, wherein said metal layer is deposited by a plating technique.

15. (New) A fabrication method of a semiconductor integrated circuit device according to claim 2, wherein said first insulation film is an insulation film having a low dielectric constant not larger than 3.

16. (New) A fabrication method of a semiconductor integrated circuit device according to claim 2, wherein said insulating copper diffusion barrier film is formed continuously without releasing to the air after steps (f) and (g).

17. (New) A fabrication method of a semiconductor integrated circuit device according to claim 2, wherein said insulating copper barrier film is a silicon nitride film or silicon carbide film.